

ADVANCING ONTARIO'S FUTURE THROUGH ADVANCED DEGREES

REPORT OF THE
COU TASK FORCE
ON FUTURE REQUIREMENTS
FOR GRADUATE EDUCATION
IN ONTARIO

NOVEMBER 2003

COUNCIL OF
ONTARIO UNIVERSITIES

COUNCIL DES
UNIVERSITÉS DE L'ONTARIO

EXECUTIVE SUMMARY

Employer demand for holders of master's and doctoral degrees exceeds the Canadian supply of graduates with these degrees, and this demand is growing. In response, the number of students available and wishing to meet that demand, by pursuing graduate education and earning those advanced qualifications, is also growing.

The Task Force on Future Requirements for Graduate Education in Ontario developed a projection of probable demand for graduate education by estimating two components. The first component, due to the "expanding undergraduate base," is derived from the current ratio of undergraduate degrees awarded to graduate enrolment. The second component, due to "increasing participation," is the additional demand associated with the continuing rise in the propensity of undergraduates to seek graduate education. It is assumed that the number of out-of-province students and of mid-career Ontarians returning from the workforce to seek advanced education keeps pace with those coming directly from Ontario undergraduate programs.

The projected demand for graduate education in Ontario increases from approximately 11,200 master's intakes in 2002-03 to 22,000 in 2013-14; and from approximately 2,300 PhD intakes in 2002-03 to 4,700 in 2013-14. If this demand were responded to by matching increases in capacity, the graduate enrolment in Ontario universities would effectively double from 34,000 to 65,000 full-time equivalents over that period.

This is a dramatic increase but the reasons are readily understood when the sources of demand are analyzed. Increased undergraduate enrolment today will lead inevitably to increased applications to graduate school in four years' time. The double cohort that has swelled the ranks of Ontario undergraduate students will flow through to graduate and professional schools later in the decade. The increasing rate of participation in undergraduate education will create an increasing pool of bachelor's graduates who form the applicant pool for graduate study. The increasing labour market demand for graduate degree holders will encourage an ever-growing proportion of bachelor's graduates to seek graduate education, resulting in continuing increases to the rate of participation in graduate education, which will compound the already existing increase in the undergraduate participation rate. The demands of the knowledge economy will require lifelong updating and upgrading of previously earned qualifications, resulting in yet another increase in demand for graduate education on the part of mid-career professionals. More and more students will be demanding access to graduate education; and the benefits to them as individuals, and to society as a whole, are readily apparent.

The limitation on meeting the labour market demand for graduates with advanced degrees and meeting student demand for places in graduate schools to acquire those advanced degrees has been, and continues to be, the capacity of institutions to accommodate increased graduate enrolment. The Task Force believes that, at a time when all jurisdictions are striving to increase their innovation, competitiveness and prosperity, if Ontario is to improve its relative position, it will have to build the capacity to meet this demand.

The primary economic impact of increased graduate education in Ontario will come from the increased productivity and innovation in Ontario's private and public sectors and the increased quality and quantity of research in its research institutions. These effects are difficult to estimate, but available research suggests they are substantial, very positive and worth the investment.

The Task Force recommends that the Government of Ontario establish a 10-year goal of doubling graduate enrolment in Ontario's universities. To begin implementing this goal, the Task Force recommends that the Government of Ontario provide full funding for graduate enrolment and task the Working Group on University Capacity with developing a detailed plan for increasing graduate enrolment in the next five years, including the funding mechanism and the implications for graduate enrolments in institutions and disciplines. It is further recommended that the Government of Ontario and the Government of Canada, with other provincial governments and university representatives as appropriate, develop a joint framework to support the increase in graduate enrolment to meet the needs of Ontario and Canada.

INTRODUCTION

TASK FORCE MEMBERS

Dr. Paul Davenport, President, University of Western Ontario, Chair
Dr. Sheila Cameron, Dean of Graduate Studies, University of Windsor
Dr. Joseph DeKoninck, Dean of Graduate Studies, University of Ottawa
Dr. Shirley Neuman, Provost, University of Toronto
Dr. Kenneth Norrie, Provost, McMaster University

The Task Force was supported by representatives from the Council on University Planning and Analysis (Ruban Chelladurai), the Association of Universities and Colleges of Canada (Herb O'Heron), and by the President and staff of the Council of Ontario Universities (Ian Clark, David Leyton-Brown, Jamie Mackay and Richard Smith).

BACKGROUND AND SOURCES

The Task Force on Future Requirements for Graduate Education in Ontario was established by the Council of Ontario Universities (COU) to develop a projection of the probable demand for graduate education in Ontario's universities to 2013-14.

During its planning for the current substantial increase in undergraduate enrolment, the joint government-COU Working Group on University Capacity recognized that planning for the impending increase in graduate education would be the next major challenge for Ontario university expansion. The Working Group agreed that COU should undertake research to estimate the future requirements. A COU Steering Group was created and was subsequently re-constituted as a Task Force chaired by Paul Davenport, President of the University of Western Ontario. The Task Force drew on work commissioned from the Conference Board of Canada and BearingPoint Consulting as well as other sources, including the Association of Universities and Colleges of Canada (AUCC), the Natural Sciences and Engineering Research Council of Canada, Ontario's Institute for Competitiveness and Prosperity, and in the United States, the National Center for Education Statistics and the Council of Graduate Schools.

The Task Force developed a detailed projection model, drawing particularly on concepts used by BearingPoint Consulting. Although many sources were used, the responsibility for the integrity of the analysis and conclusions contained in this report is that of the Task Force and of the Council of Ontario Universities.

GRADUATE EDUCATION IN ONTARIO

THE GRADUATE LEARNING ENVIRONMENT

The graduate learning environment is distinctly different from that at the undergraduate level. The differences have been described in the advanced, focused and scholarly character of graduate education.¹ It is *advanced* in that it is not simply another year or more of the same, but is based upon prior completion of an undergraduate degree in the same or related areas as the basis of admission and upon the prerequisite knowledge gained in that undergraduate education. It is *focused* in that while breadth of knowledge is important, the emphasis is on depth – concentration of study in a discipline, in a field within that discipline, and through the thesis research, in a subject within the field. It is *scholarly* in that it is concerned not simply with the acquisition of knowledge and skills, but with the critical analysis of existing knowledge and the creation of new knowledge. A research component is essential in every graduate program, including professional programs, as graduate students acquire and apply advanced analytical and interpretive skills, and develop and demonstrate the capacity to engage in the kind of research appropriate to their discipline or profession. Graduate programs are designed to produce an environment that is extremely challenging, engaging the students in an environment of intense and ongoing intellectual interaction in and out of class with faculty and with each other.

Graduate programs are defined by these characteristics, and not by the degree awarded. Most master's and doctoral programs are of this kind, including professional programs like the MBA (business administration), the LL.M. (law) or the MSW (social work). However some second-entry, first professional degree programs are not considered graduate programs because they do not have all of these characteristics (especially in regard to the basis of entry), whether the degrees they award are at the bachelor's level – as with the BEd (education) or LL.B. (law) – or even at the doctoral level, as with the MD (medicine), the PharmD (pharmacy), or the JD (law).²

THE EVOLUTION OF GRADUATE EDUCATION IN ONTARIO

The university system of Ontario, and its involvement in graduate education, began in the 19th century. The first university charter was granted to King's College in 1827 (which became the University of Toronto in 1850). Queen's University followed in 1841, the University of Ottawa in 1866, the University of Western Ontario in 1878, and

¹ Jules Lapidus, President, Council of Graduate Schools, Washington, D.C.

² In this report, the term doctoral program is used interchangeably with PhD program, and thus does not include MD, PharmD or JD programs.

McMaster University in 1887. Most of today's other publicly assisted universities were created after the Second World War, most notably in the 1950s and 1960s.

While research and graduate education are as old as universities themselves, the development of formal graduate programs and graduate degrees was slower to evolve. The first three MA degrees in Ontario were awarded by King's College in 1845, but the first PhD was not awarded until 1900. The first PhD program in the United States was offered at Yale University in 1860. The University of Toronto's first PhD program, which began in 1897, was heavily modelled on the doctoral program at Cornell University, and to some extent on that of Yale, both of which had taken up the German university model of graduate research training. By contrast, British universities did not establish graduate programs until just after the First World War.

The number of full-time graduate students in Ontario has grown from 120 in 1920 to 1,452 in 1945, to 6,874 in 1965, representing 13 percent of total provincial university enrolment.¹ By contrast, in 2002 there were 30,749 full-time graduate students, representing 11.2 percent of total provincial university enrolment.

The Spinks Commission in 1966 observed that "there is an almost inexhaustible market for higher-degree graduates in Ontario and, since Ontario has traditionally also helped to staff the universities and professions of all Canada, the problem of demand is an acute one."² Those words are even truer today than when they were first written.

Since the mid-1960s, Ontario has been assured that every new graduate program in the province was above an acceptable threshold level of academic quality, because of the longest continually operating external quality assurance agency in the world, the Ontario Council on Graduate Studies, and its formal appraisal process. In 1982, the universities also committed to have all existing graduate programs appraised on a seven-year cycle, and not to continue admitting students to any program that was found not to meet the quality standards.

THE INTERNATIONAL CONTEXT

Graduate programs recruit students nationally and internationally in order to attract and admit the highest qualified students. The contributions of graduate students to the research agendas of their universities, to current undergraduate education, and to the pool of future faculty requires that graduate recruitment be aimed at only the best and most accomplished students. In the intense and interactive research-based learning environment that characterizes graduate education, graduate students learn with and from each other as well as from their faculty, and the quality of graduate education is in no small part related to the quality of the graduate student body. Graduate education must be made available to the best Ontario students, as well as the best students from across

¹W. I. Spinks, Gustave O. Arlt and F. Kenneth Hare, *Report of the Commission to Study the Development of Graduate Programmes in Ontario Universities*, for the Committee on University Affairs and the Committee of Presidents of Provincially-Assisted Universities, Toronto, November 1966, p. 17.

²*Op. cit.*, p. 23.

Canada and around the world to enrich the graduate learning experience for Ontario students, and for those from beyond the province.

International graduate students provide many benefits. While students, they enhance the quality of the student body, bring an intellectually enriching diversity of perspectives and academic experience into the classroom, and contribute in essential ways to the productivity and innovation of university research. After graduation, many remain in Canada as landed immigrants, adding to the knowledge base and human capital necessary for the achievement of innovation, competitiveness and prosperity goals. Many start-up companies have been founded by individuals who entered their graduate programs as international students. Many of those who return to their home country do so as ambassadors, building on their experience in graduate school with economic and other interactions that provide commercial and other returns to Canada and Ontario. Whether they stay in Canada or return to their home country, they have benefited Canada from being graduate students here.

DEMAND FOR GRADUATE EDUCATION

INCREASED LABOUR MARKET DEMAND FOR HOLDERS OF GRADUATE DEGREES

A recent Statistics Canada study shows that the proportion of knowledge workers in the labour force has increased steadily over the past three decades, across all sectors of the economy – almost doubling from 1971 to 2001.⁵

Exhibit 1 illustrates the remarkable growth in labour market demand for those with master's and doctoral degrees. Employment for those with graduate degrees increased by 65 percent between 1990 and 2002 – fully four times faster than the overall rate of growth in the Canadian labour market. Public sector and private sector employers are hiring holders of advanced degrees, and the Task Force believes they will do so at an increasing rate in the future as the demands of the knowledge economy expand and as the baby-boom generation approaches retirement.

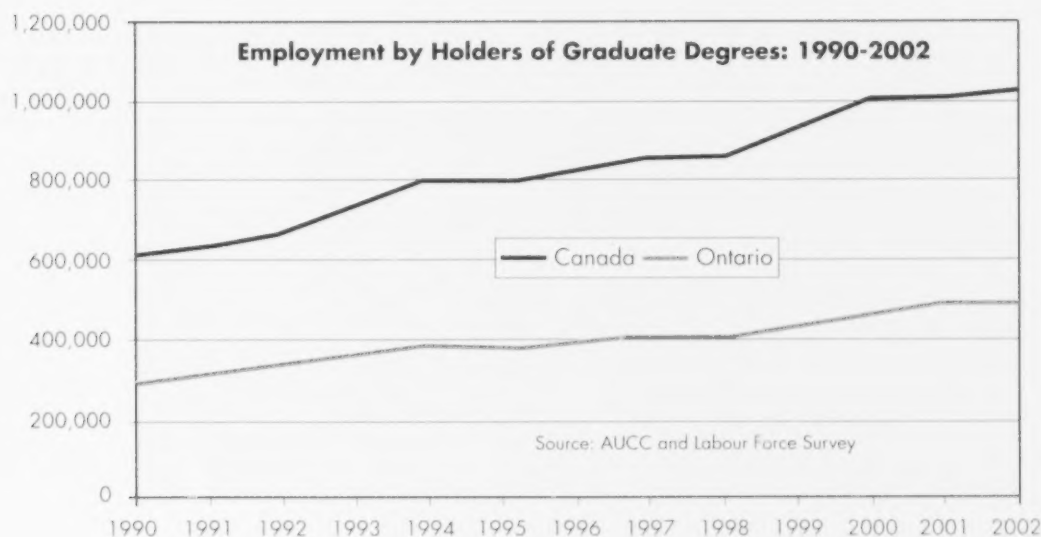


Exhibit 1: Demand is growing rapidly for graduate degree holders.

⁵ The growth was most rapid in professional occupations, and in the provinces of Ontario and Quebec. *Knowledge Workers in Canada's Workforce: 1971-2001*. Canadian Economy Transition Series, Statistics Canada, Ottawa, 2003.

Exhibit 2 shows the results of an AUCC analysis of Statistics Canada data. It demonstrates that Canadian universities collectively have fallen about 200,000 short of producing the number of advanced degree graduates employed, and the shortfall has been made up by immigration and repatriation of Canadians. Canada benefits from bringing in highly qualified graduates of foreign universities, but the country should not deny its own citizens the opportunity to fill desired positions in the economy.

One might ask if the lower unemployment rate for holders of graduate degrees, and the fact that employers are hiring ever-increasing numbers of those with advanced degrees, represents the willingness of employers to hire people who are "overqualified" for certain positions that require lesser qualifications such as an undergraduate degree. The answer lies in the fact that employers are putting their money where their hiring decisions are. They are paying more to those with advanced degrees than to those with bachelor's degrees. It can therefore be concluded that employers realize an economic benefit that is greater than the additional salary they pay. Advanced degrees are wanted and needed in increasing numbers in the economy of today and tomorrow.

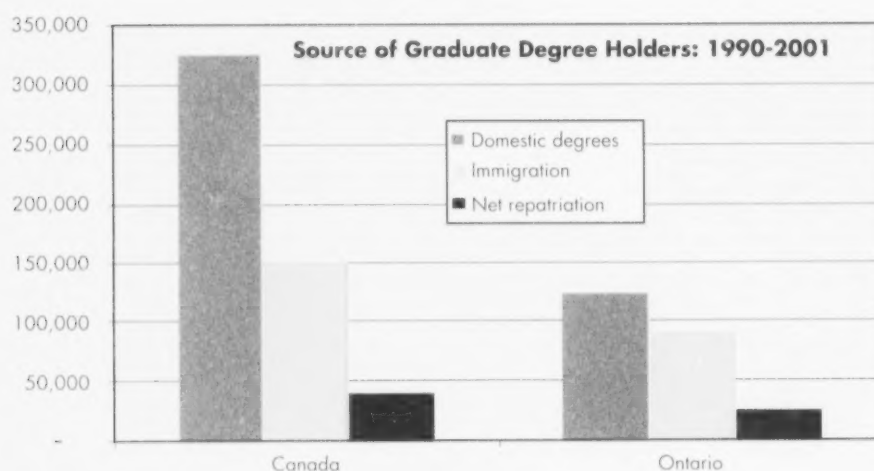


Exhibit 2: Canada's, and especially Ontario's, universities produced far fewer degree holders than were newly employed since 1990. (Source: AUCC. Net repatriation is a derived number equal to the difference between employment and the sum of domestic degrees and immigrants with advanced degrees.)

One clearly identifiable source of labour market demand for PhDs is as university faculty members. It is now well established that universities are on the threshold of massive waves of hiring new faculty. COU has projected that Ontario's universities will need to hire 11,000 additional faculty by the end of the decade in order to replace retiring faculty and to teach the increased number of undergraduate students. Even more will be needed to teach and supervise the increased number of graduate students necessary to generate the PhDs to replenish the professoriate. Nationally, Canadian universities will require over 30,000 new faculty in the same period. The possible elimination of mandatory retirement is not a solution to this problem. Experience in U.S. jurisdictions where

mandatory retirement has been eliminated has shown that the average age of retirement for university faculty is 68, and virtually no faculty continue to teach beyond the age of 70. At best the elimination of mandatory retirement would defer the replacement of faculty for up to three years. Retiring faculty will still need to be replaced, and new faculty will still need to be hired to teach the increasing numbers of undergraduate and graduate students. What is more, historically only one-third of PhDs are employed in university faculty positions. The higher average income of PhD holders is a consequence of the two-thirds who work outside the universities. The competitiveness and prosperity of the Ontario economy rest upon satisfactory response to this growing labour market demand.

Within universities there is not only increasing labour market demand for graduate degree holders as faculty members, but also for graduate students as students to contribute to the delivery of undergraduate education in the capacity as teaching assistants. Increasing undergraduate enrolment creates a requirement for increasing numbers of graduate teaching assistants simply to maintain the undergraduate curriculum, and even greater numbers to improve the quality of undergraduate education by reducing the size of tutorial discussion groups and laboratory groups. Increased graduate enrolment is not an alternative to undergraduate enrolment, but a complement and contributor to it.

INCREASED STUDENT DEMAND FOR GRADUATE EDUCATION

Fortunately, it is possible to respond affirmatively to this growing labour market demand. There are increasing numbers of students who want the graduate education that will prepare them to take advantage of these opportunities. No university or government would wish to deny qualified citizens of Ontario the opportunity to do so.

The economic returns to graduate education are clear from longstanding patterns in employment rates and earnings, as illustrated in Exhibits 3 and 4.

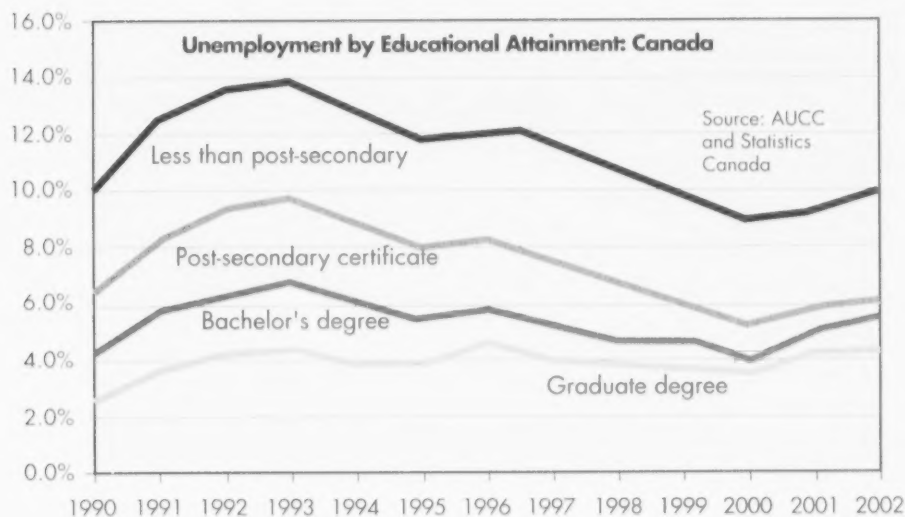


Exhibit 3: Graduate degree holders have much better employment prospects.

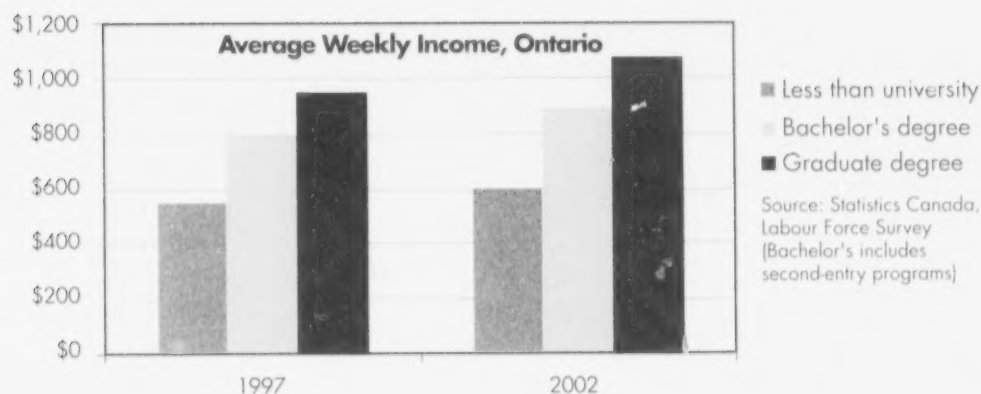


Exhibit 4: Graduate degree holders earn more.²

The value of a graduate degree, as illustrated in Exhibits 3 and 4, is well appreciated by Ontarians, and undergraduate students are demanding opportunities to attend graduate schools in increasing numbers.

ECONOMIC IMPACT OF GRADUATE EDUCATION IN ONTARIO

The primary economic impact of increased graduate education in Ontario will come from the increased productivity and innovation in Ontario's private and public sectors and the increased quality and quantity of research in its research institutions. These effects are difficult to estimate, but available research suggests they are substantial, very positive and worth the investment.

Several comprehensive studies of Ontario's competitiveness have recently been undertaken by Ontario's Institute for Competitiveness and Prosperity, supporting the Task Force on Competitiveness, Productivity and Economic Progress, chaired by Roger Martin. The Martin Task Force has concluded that the most likely contributor to the productivity difference between North America's leading jurisdictions and Ontario is the overall level of investment in university education, and particularly in graduate education.

²An AUCC special tabulation from Statistics Canada from the 2000 Census provides comparisons of income between different levels of graduate degrees and separates the medical degrees from undergraduate degrees. The results reinforce Exhibit 4 and indicate clearly that the more advanced the degree, the higher the average earnings that can be expected. In Ontario, those with a master's degree earned 29 percent more and those with a doctoral degree earned 37 percent more than those with a bachelor's degree.

Graduate Degrees Conferred per 100,000 Population, 1997

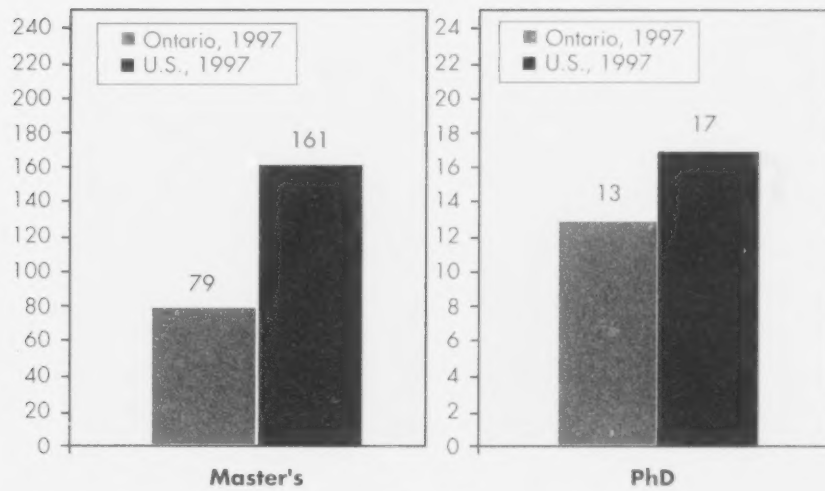


Exhibit 5: Comparison of graduate degrees granted in Ontario and the United States

(Source: Statistics Canada custom tabulation for the Institute for Competitiveness and Prosperity).

As illustrated in Exhibit 5, Ontario trails the U.S. in master's degrees awarded per 100,000 population (1997-98) - 79 compared to 161 - and PhD degrees awarded - 13 compared to 17.

In its First Annual Report, the Martin Task Force drew the following conclusions:

"In primary and secondary education, Ontario has a proud tradition of investing heavily in a broad and deep system. In fact, including spending from all sources, Ontario has historically out-invested the United States in primary and secondary education as a percentage of GDP...However, Ontario's historic lead in investment in primary and secondary education was fully eroded by 1997-98. Today, that investment may even be below US levels.

At the college level of post-secondary education, the data are less comparable and clear, but they suggest that Ontario invests competitively in the college system. For example, in 1997-98, Ontario invested \$8,846 in operating expenditures per student in community colleges and the US \$8,575 - giving Ontario a 3 percent lead in investment at the college level. On a per capita basis, total operating expenditures in Ontario's colleges were \$119 annually through the 1990-96 period, while in the US they were \$115.

At the university level, the pattern begins to change, and investment per student dips dramatically below US levels. While Ontario leads slightly in number of bachelor's degrees conferred per 1,000 population...the US leads dramatically at the master's level. Our US peer group continues the investment farther along the higher education spectrum than does Ontario, especially at the level of "terminal master's" - the final degree for the vast majority of its holders before they enter the economy to enhance productivity. The US also outproduces Ontario in conferring PhDs, though by a substantially lower margin than at the master's level. In addition, the US investment per student in universities dramatically outpaces Ontario. The US out-invests Ontario by almost 2 to 1 in spending on higher education as percentage of GDP."¹

In its follow-up analysis on urban regions², the Martin Task Force has concluded that \$1,480 or 21 percent of Ontario's urban prosperity gap - the shortfall in GDP per capita in urban areas - compared with the peer group of U.S. states is attributable to the lower level of educational attainment. The Annual Report found that the proportion of degrees awarded was more imbalanced at the graduate than the undergraduate level, which implies that the urban prosperity gap is overwhelmingly attributable to lower levels of graduate degree production.³

It is also possible to make estimates of the impact on provincial and federal tax receipts attributable to the higher earnings of citizens with graduate education. The 2001 study by Enterprise Canada⁴, commissioned by COU, computed that in 1998 a graduate degree holder paid approximately \$250 more in provincial taxes and \$550 more in

¹In making its comparisons, the Martin Task Force converts American currency to Canadian dollars on a purchasing power parity basis.

²*Closing the Prosperity Gap: First Annual Report*, November 2002 Task Force on Competitiveness, Productivity and Economic Progress, p. 33.

³*Missing Opportunities: Ontario's Urban Prosperity Gap*, Institute for Competitiveness and Prosperity, Working Paper 5, June 2003, pp. 20-21.

⁴The master's degree figures may not be entirely comparable, because the U.S. figure contains some second-entry professional programs that are not included in the Ontario figure. For example, in some U.S. states the second-entry teaching degree is an M.Ed. rather than a B.Ed. However, even in this discipline the impact of this methodological difference is not expected to change the relationship materially, as the vast majority of U.S. teachers have bachelor's degree qualifications.

⁵*The Economic Impact of Ontario's Universities*, Enterprise Canada Research, January 2001. The study examined five components: expenditures by universities and out-of-province students; benefits due to R&D activity conducted by universities; additional earnings of university degree holders; and the cost avoidance due both to additional philanthropic giving as well as to additional volunteer contributions by university graduates.

federal taxes than the average bachelor's degree holder (including second-entry professional degrees such as medicine and law in the bachelor's group).¹⁷

The study also estimated that, in 1998, out-of-province graduate students¹⁸ contributed \$42 million to the Ontario economy, helped create approximately 1,000 jobs and provided \$1.5 million in provincial sales taxes to the Ontario government. The study noted that these calculations did not include estimates of the long-term benefit resulting from hosting these students at Ontario universities, such as the development of academic and personal relationships that could translate subsequently into economic relationships.

¹⁷ In 1998, there were 264,020 postgraduate degree holders in Ontario, with 10,797 graduates completing their degree in 1997 and entering the labour force in 1998.

¹⁸ In 1998, there were approximately 2,000 graduate students, both full and part time, from outside the province. The estimated contributions do not include the impact of tuition fees paid, as these were included in the spending by universities themselves, and so represent a lower bound of the beneficial effects.

ESTIMATING THE DEMAND FOR GRADUATE ENROLMENT: THE COU PROJECTION MODEL

THE PROJECTION METHODOLOGY

The Task Force developed a model for projecting demand for graduate education in Ontario by analyzing two components: that associated with an expanding undergraduate base and that associated with an increasing participation rate.

Approximately two-thirds of the graduate students in Ontario universities have recently been undergraduates in Ontario universities.¹⁴ It would therefore be expected that the relationship between the demand for graduate intake and the number of undergraduate degrees awarded would be dominated by the "flow through" of a given percentage of Ontario undergraduates pursuing graduate studies. In the simplest case, a given percentage of undergraduates receiving degrees go directly to a master's program and some portion of these graduates enter a PhD program two years later. The first-year (fall) enrolment in master's programs should bear a direct relationship to the number of undergraduate degrees awarded (mostly in the spring) of the same calendar year (the previous academic year). The first-year PhD enrolment should bear a relationship to the undergraduate degrees awarded three academic years earlier.

Actual graduate enrolment patterns are more complicated than this because some undergraduates delay their entry into master's programs, some take longer than two years to finish, and some transfer to PhD programs before two years without receiving a master's degree. As well, a certain percentage of graduate enrolment is composed of Ontarians who come back to university after several years in the workforce and another percentage is made up of students from other provinces and other countries.

The Task Force assumes that these various sources of graduate enrolment represent relatively stable percentages of the total enrolment. In other words, the Task Force assumes that the proportion of students entering graduate programs in Ontario from mid-career positions and from outside the province will remain relatively constant. Similarly, the projections of undergraduate enrolment assume that the ratio of intakes from Ontario secondary schools and from other sources remains constant.

All the numbers described in the following sections are included in the Annex to this report.

¹⁴ Although data are not collected systematically on the origins of graduate students, this estimate has been provided by the Executive Director of the Ontario Council on Graduate Studies following consultations with graduate deans in Ontario universities.

PROJECTING RATIOS OF GRADUATE INTAKE TO UNDERGRADUATE DEGREES

The Task Force believes that the ratio of graduate intake to undergraduate degrees would continue to increase if places were made available, because of:

- a. the increasing propensity of undergraduates graduating from Ontario universities to pursue graduate studies,
- b. the increasing propensity of Ontarians in the labour force to return to university for graduate education to enhance their knowledge and credentials, and
- c. the increasing numbers of highly qualified out-of-province and international students attracted to Ontario universities to conduct graduate research and obtain graduate degrees.

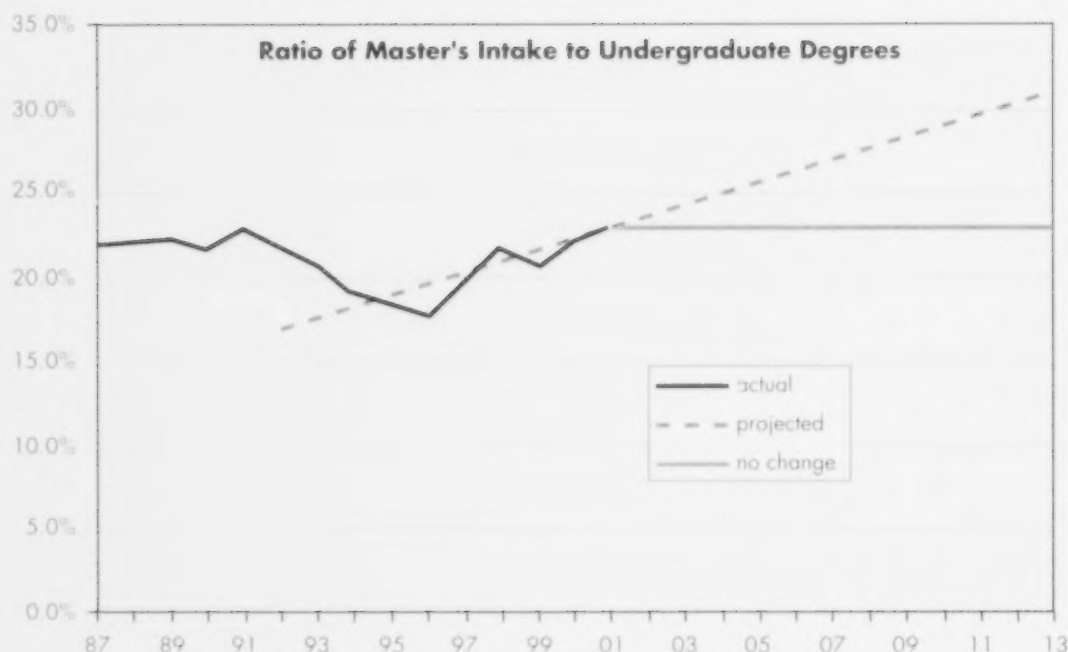


Exhibit 6. Ratio of master's intake to bachelor's degrees awarded (year refers to beginning of academic year).

As noted earlier, the Task Force assumes that the rates of growth for each of these three effects are comparable so that the proportion of graduate enrolment from undergraduate programs, from the workforce and from out of province remain relatively constant over the next decade. All three sources of increased demand will be included as part of "increased participation."

Consistent with this assumption of increasing participation rates, the Task Force made its projection on the basis of a reasonable fit of recent trends in the ratio of graduate intake to undergraduate degrees awarded. The Task Force expects the two key participation rates – the ratios of master's intake and PhD intake to undergraduate

degrees – to increase during the next decade because of strong increases in both the labour market demand for holders of graduate degrees and the student demand for graduate education, as described in the previous section of this report. These increasing participation rates in Ontario should begin to close the gap in graduate education with the United States identified by the Martin Task Force.

The ratios for both master's and PhDs were reviewed separately. In making its estimates of the likely trend in the ratio of demand for graduate intake to undergraduate degrees awarded, the Task Force assumed that entrance standards would be maintained and that the difficulty of being admitted to graduate school would remain comparable to what it is today in Ontario.

The Task Force's projection is based on its view that:

- a. The decline in ratios for master's and PhDs in the early 1990s was due to a lack of graduate degree positions offered in universities and to the temporary labour market effects of one of the most severe recessions in Ontario's history.
- b. The increase in the ratios in the latter part of the decade, despite tight funding constraints in graduate programs, reflects the change in the labour market and this will continue for the next decade.

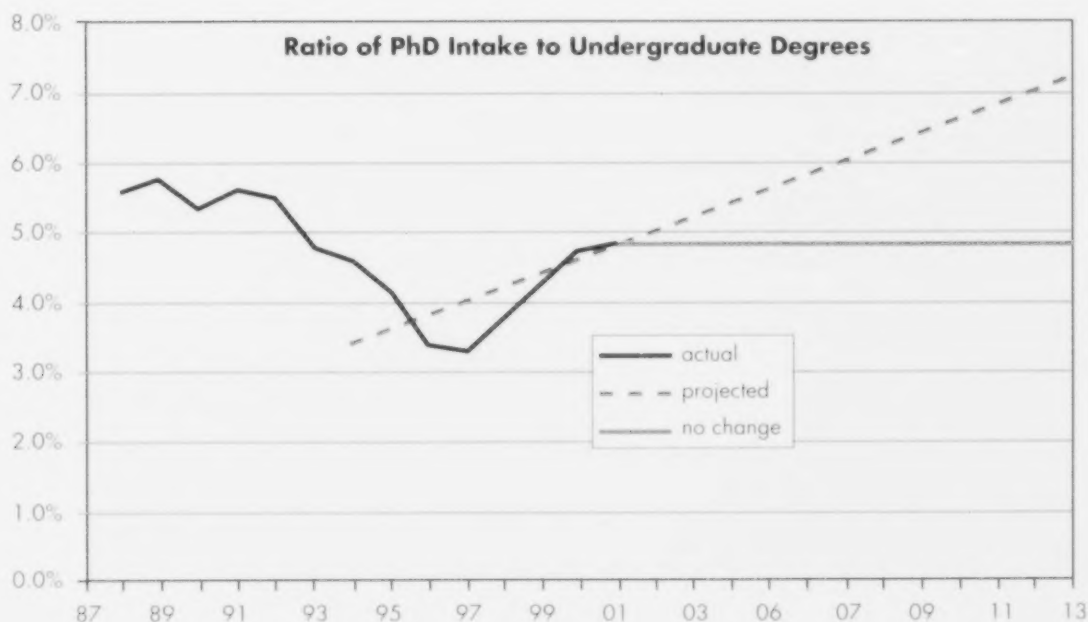


Exhibit 7: Ratio of PhD intake to undergraduate degrees awarded three years earlier (year refers to beginning of academic year).

The projections suggest that the ratio of master's intake to undergraduate degrees rises from 22.9 percent in 2001-02 to 30.8 percent in 2013-14. The ratio of PhD intake to undergraduate degrees awarded three academic years earlier rises from 4.8 percent in

2001 to 7.2 percent in 2013-14. In proportional terms, this is a slightly faster rise in ratios than for master's intakes. The Task Force believes that this is consistent with the trend in several universities to create more direct entry PhD programs.

CALCULATING INTAKES, GRADUATE DEGREES AWARDED AND FULL TIME EQUIVALENT (FTE) ENROLMENT

The number of master's intakes in a given year can be calculated as the number of undergraduate degrees awarded the previous academic year times the ratio of intakes to undergraduate degrees awarded.

The number of degrees awarded can be related to the intake in the previous academic year by a "graduation rate factor." Using observations from the previous 15 years, this factor was calculated to be 0.88 and it is assumed to remain constant over the projection period.

Since master's degrees on average require two years of study, the full-time equivalent (FTE) master's enrolment is assumed to be the sum of the intake in that year and the previous year, multiplied by a scaling factor to take account of attrition and variations in the length of master's study. Using observations from the previous decade, this scaling factor was calculated to be 0.95 and it is assumed to remain constant over the projection period.

Applying these factors to the projections of master's ratios from Exhibit 6 produces the projections of intakes, graduate degrees and FTE enrolment shown in Exhibit 8.

The number of PhD intakes in a given year can be calculated as the number of undergraduate degrees awarded three academic years earlier times the ratio of intakes to undergraduate degrees awarded three years earlier. The number of degrees awarded can be related to the intake to the PhD program six¹⁵ years earlier by a "graduation rate factor."¹⁶ Using observations from the previous decade, this factor was calculated to be 0.72 and it is assumed to remain constant over the projection period.

Since PhD degrees are assumed on average to require six years of study, the full-time equivalent (FTE) PhD enrolment is assumed to be the sum of the intake in that year and the previous five years, multiplied by a scaling factor to take account of attrition and variations in the length of PhD study. Using observations from the previous decade, this scaling factor was calculated to be 0.95 and it is assumed to remain constant over the projection period.

Applying these factors to the projections of PhD ratios from Exhibit 7 produces the projections of intakes, graduate degrees and FTE enrolment shown in Exhibit 9.

¹⁵ In order to take account of the fact that students take varying times to graduate, the number of graduates was calculated as the average intake of five, six and seven years earlier times the "graduation rate factor."

¹⁶ Note that this "graduation rate factor" is not identical to the more standard graduation rate calculated on the basis of the percent of students who have received their degrees within a certain number of years after initial enrolment.

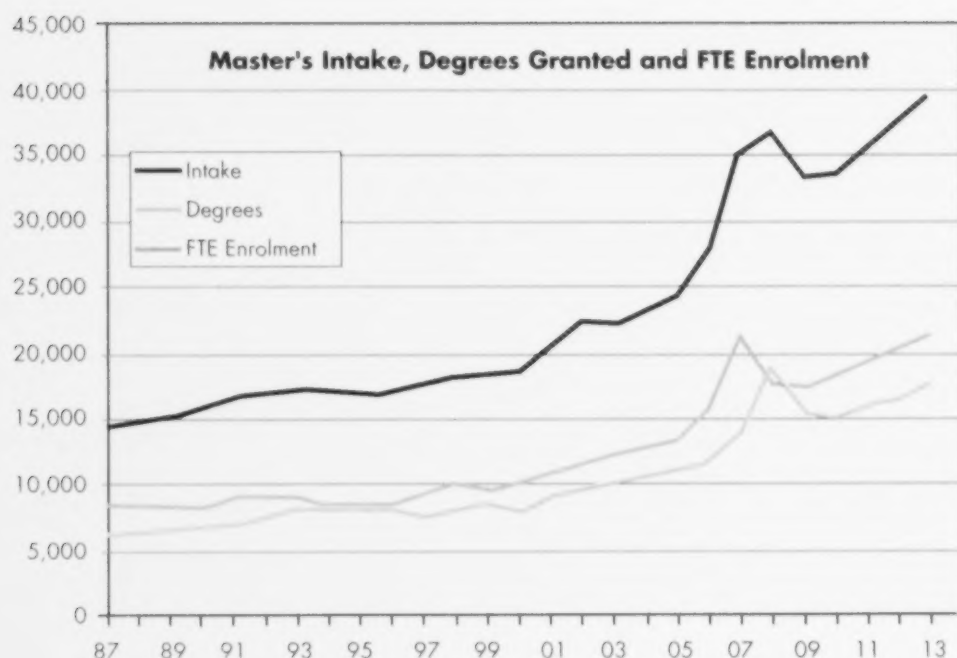


Exhibit 8: Projections of master's intakes, degrees and FTE enrolments based on the projected ratio of intakes to undergraduate degrees awarded (year refers to beginning of academic year).

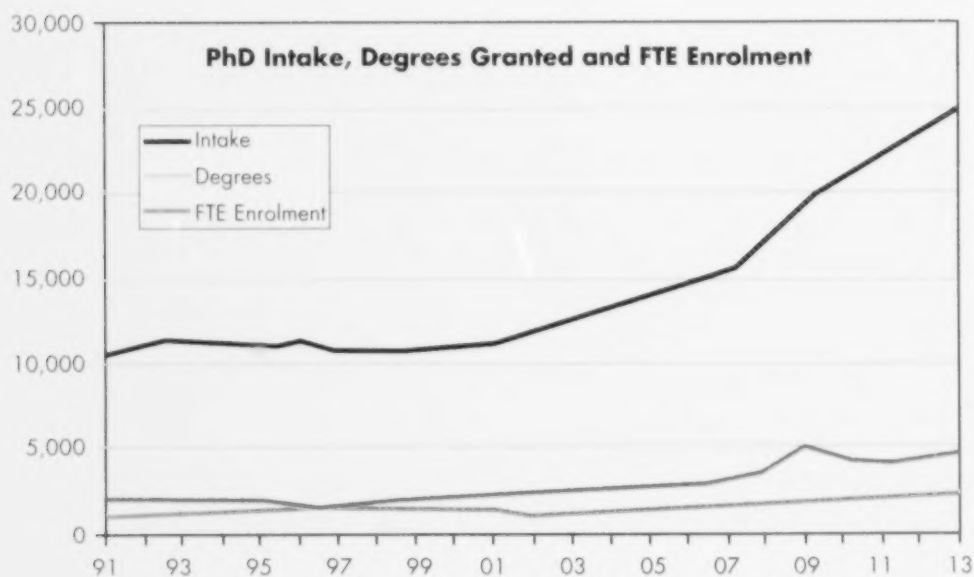


Exhibit 9: Projections of PhD intakes, degrees and FTE enrolments based on the projected ratio of intakes to undergraduate degrees awarded (year refers to beginning of academic year).

FTE GRADUATE ENROLMENT ASSOCIATED WITH THE EXPANDING UNDERGRADUATE BASE
(WITH NO INCREASE IN THE RATIO OF GRADUATE INTAKE TO UNDERGRADUATE DEGREES)

The first component of total graduate enrolment is based on maintaining the current ratios of intakes to undergraduate degrees. As seen from Exhibit 6, this holds first-year enrolment in master's programs at 22.9 percent of the number of undergraduate degrees awarded the previous academic year and, as seen in Exhibit 7, this holds first-year enrolment in PhD programs at 4.8 percent of the number of undergraduate degrees awarded three academic years earlier.

The projection for FTE graduate enrolment associated with the expanding undergraduate base, with no increase in ratio of graduate intake to undergraduate degrees, is shown in Exhibit 10.

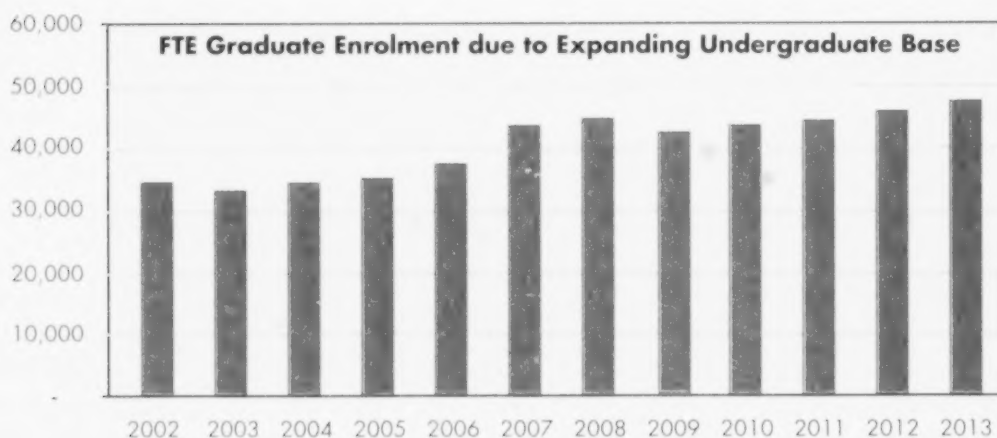


Exhibit 10: The projected demand for graduate enrolment associated with an expanding undergraduate base with no change in participation rates (year refers to beginning of academic year).

INCREASED FTE GRADUATE ENROLMENT ASSOCIATED WITH INCREASED PARTICIPATION RATE
(INCREASED RATIO OF GRADUATE INTAKE TO UNDERGRADUATE DEGREES)

When the increases in participation rates indicated by the reasonable fit lines in Exhibits 6 and 7 are translated into FTE enrolments, the result is shown in Exhibit 11, the contribution to total demand for graduate education from the projected increase in the ratios of master's and PhD intakes to undergraduate enrolment.

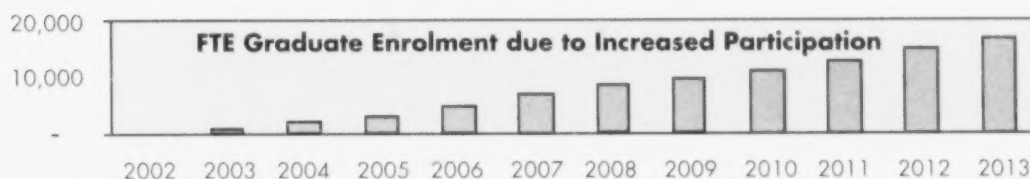


Exhibit 11: The contribution to total demand from increased participation (year refers to beginning of academic year).

TOTAL FTE GRADUATE ENROLMENT IN ONTARIO

The sum of the numbers in Exhibits 10 and 11 are shown on the next page in Exhibit 12, which suggests a graduate enrolment of 64,632 in 2013-14, up from 34,410 in 2002-03, an increase of 88 percent.

In light of these projections, the Task Force believes that Ontario should adopt a goal of "doubling graduate enrolment in the next decade."

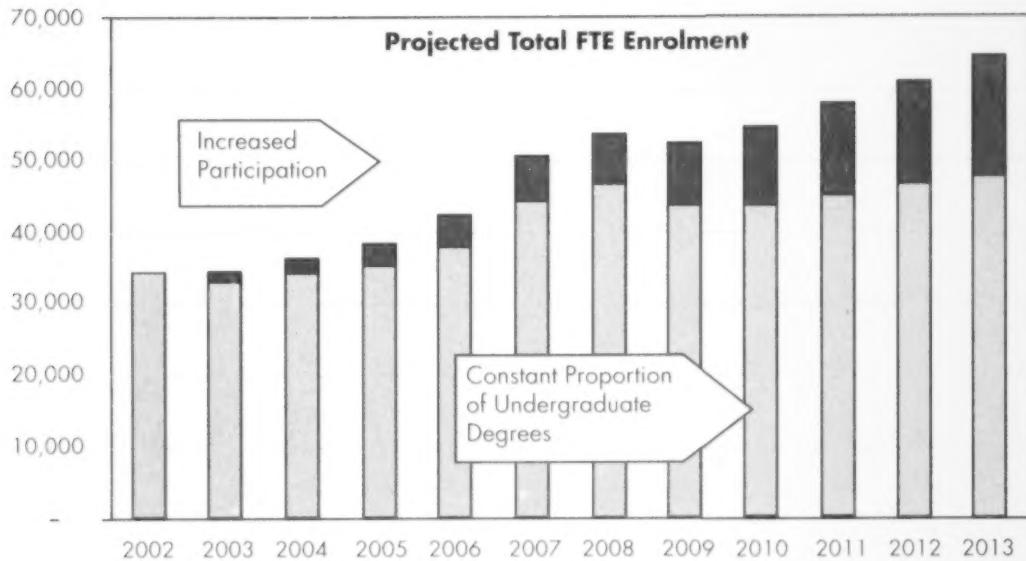


Exhibit 12: Projected total demand from expanded enrolment base and increased participation (year refers to beginning of academic year).

Although the Task Force has focused on the period to 2013-14, it is worth making a few observations on the years beyond, particularly in respect of the demographics of the "baby boom echo." Projections from the Ontario Ministry of Finance suggest that the size of the 18- to 22-year-old band peaks in 2014. However, during much of the 2014 to 2020 period, graduate schools will have to accommodate students who enrolled as undergraduates before 2014.¹⁷ The passage of the baby boom echo probably means that in the decade following 2013-14 graduate education capacity will not have to expand as dramatically as during the coming decade. The graduate education projections can be regularly updated to take account of new data and projections of the relevant factors, particularly net migration to Ontario and undergraduate and graduate participation rates. On the basis of data currently available, the Task Force believes that there is no danger of Ontario overbuilding its long-term graduate education capacity if the growth indicated in Exhibit 12 is fully accommodated.

¹⁷ The Ministry of Finance projections suggest that the 18- to 19-year-old range of the cohort peaks in 2014 at 365,000 and will decline to roughly 335,000 for the next decade. It would be four years before the smaller entering undergraduate class flow through to master's programs, and another five or six years before affecting the PhD degree figures.

COMPARISONS WITH OTHER JURISDICTIONS

Increasing graduate enrolment by 88 percent in a decade might seem a dramatic increase. But it would not put Ontario out of line with historical international levels or the levels implicit in the national targets set out in the federal government's innovation agenda. Indeed, it would only bring Ontario into the range of U.S. graduate degree production 15 years earlier.

The Spinks Commission reviewing Ontario university enrolment in the 1960s observed, "in mature institutions elsewhere graduate enrolment is rarely higher than 30 percent and is usually nearer 20 percent. Institutions with doctoral programmes should certainly work towards these figures but should exceed 30 percent only in the rare cases where world stature has been attained."¹⁸ Sixteen of the 18 publicly assisted universities in Ontario now offer doctoral programs, and if graduate enrolment were in the range advocated (in 1966 when the societal need and demand for graduate education had not risen to today's levels) by the Spinks Commission of 20 percent of total provincial university enrolment, the total full-time graduate enrolment today would be 61,000 rather than the actual 30,749.

The federal innovation strategy¹⁹ calls for "through to 2010, increase the admission of master's and PhD students at Canadian universities by an average of 5 percent per year." A 5 percent compound growth rate leads to an increase of 63 percent in a decade. Traditionally, Ontario has contributed more than its population share of graduate degrees so that an increase in Ontario graduate enrolment in the range of that projected by the Task Force would be needed to sustain the federal growth targets.

In 2013-14, the projection suggests 17,807 master's degrees, an increase of 81 percent over 2003-04. This would be 131 per 100,000 population, which would still be substantially below the U.S. rate of 161 per 100,000 that prevailed in 1997. In 2013-14, the projection suggests 2,344 PhD degrees, an increase of 97 percent over 2003-04. This would be 17 per 100,000 population, which would just achieve the U.S. rate of 17 per 100,000 that prevailed in 1997.²⁰ These comparisons are made in Exhibit 13, which add the Ontario projection numbers to the 1997 Ontario-U.S. comparisons shown earlier in Exhibit 5.

¹⁸ Ibid.

¹⁹ <http://www.innovationstrategy.gc.ca/cmb/innovation.nsf/MenuE/InnovationTargetAnalysis>

²⁰ The projection has the number of PhD degrees increasing significantly in the two years following the end of the projection period. PhDs awarded in 2014-15 and 2015-16 would be 2,856 and 3,111, respectively.

Graduate Degrees Conferred per 100,000 Population

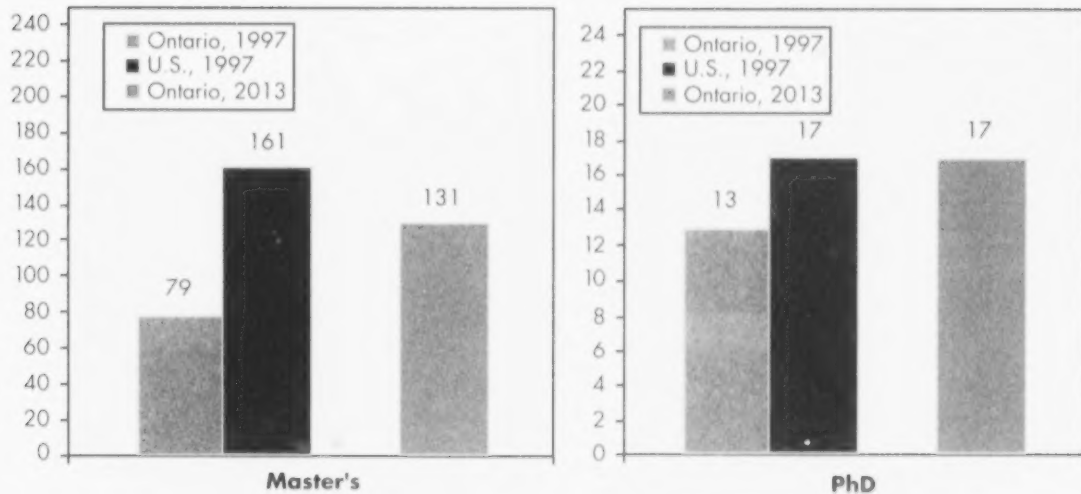


Exhibit 13: Comparisons of graduate degrees granted in Ontario and the United States, including the Task Force's projection to 2013-14.

Another potentially relevant parameter for interjurisdictional comparison is the fraction of the population in the 25- to 31-year-old range that is in graduate school. If Ontario were to double its graduate enrolment in a decade, the graduate enrolment would be approximately 5.2 percent¹⁷ of the 25- to 31-year-old population, up from 3.0 percent today. This would be lower than it is in the state of New York today (6.0 percent), and only somewhat higher than it is in Michigan today (4.4 percent). It is likely that graduate participation rates will continue to rise in leading American states so that doubling Ontario's graduate enrolment would likely bring it into line with these states.¹⁸

From these perspectives, a seemingly dramatic goal of doubling graduate enrolment in a decade could be viewed as rather modest. It would bring the production of advanced degrees in Ontario to roughly the levels achieved in the United States 15 to 20 years earlier.

¹⁷ Based on 1996 population projections.

¹⁸ Figures generated for the Task Force by the Conference Board of Canada from the National Centre for Education Statistics, 2002, *Projections of Education Statistics to 2012*, Washington, D.C.; from the U.S. Census Bureau Population Projections; from the Michigan Department of Education; and from the New York State Department of Education Office of Higher Education (Office of Research and Information Systems).

RESOURCE IMPLICATIONS

The operating grant associated with the present and projected level of undergraduate and graduate enrolments is set out in Exhibit 14.

2002-03 (Actuals)	
Number of graduate students (FTE enrolment)	34,410
Grant at full funding	\$413 million
Actual grant for graduate students	\$370 million
Unfunded amount for graduate students	\$43 million
2013-14 (Task Force Projected Demand)	
Number of graduate students (FTE enrolment)	64,632
Grant at full funding	\$776 million
Additional funds required (including the funding for currently unfunded graduate enrolment)	\$406 million

Exhibit 14: Calculation of government operating grant associated with Task Force projections.²⁴

From Exhibit 14 it is seen that the amount to fully fund the current graduate enrolment is \$413 million. This means that the cost, in constant dollars, to increase graduate enrolment by the 88 percent projected by the Task Force from a fully funded current base would be about \$363 million, for a total grant at full funding of \$776 million. The annual grant associated with a doubled enrolment at full funding would be two times \$413 million, or \$826 million.

In addition to operating funds to hire professors and staff and to contribute to the general upkeep, it will be necessary to incur capital costs to build and equip the laboratories, libraries and other instructional facilities in which graduate education will occur. A good deal of work still needs to be done to obtain an accurate assessment of the capital funding needed to support expanded graduate enrolment. If the amount of classroom and laboratory space currently used by graduate students had to be replicated with newly constructed facilities, the cost of doubling capacity would be over \$2 billion.

²⁴ The requirements for operating funding are stated in real, inflation-adjusted dollars, using 2002 as the base year for prices. The failure to fund the actual cost increases in Ontario universities over the past decade has produced a large decline in real operating revenues per student and a significant increase in the student-faculty ratio at Ontario universities. Looking forward, the Task Force believes that the government should build necessary cost adjustments into the planning for public support for universities. Thus, the current-year total expenditures required for expanding graduate enrolment will be greater than those shown in this exhibit, since the annual grant should be adjusted each year to take account of inflation.

However, if deferred maintenance needs are addressed and old space is used more efficiently, the cost of additional space would be reduced, perhaps by as much as one-third. Funding for such facilities has traditionally come from a combination of provincial capital and facilities renewal funding, federal research and infrastructure funding, and private sources.

As noted above, Ontario universities, like all research-oriented universities in North America and worldwide, seek to recruit only the best and most accomplished students into research master's and doctoral programs. In the highly competitive recruitment environment such students will be offered substantial financial assistance at every university to which they are offered admission – substantial enough not only to enable mature students, often with family responsibilities, to pursue extended graduate programs of study and research, but also to make it financially attractive to forego immediate employment opportunities or offers of admission from other universities. In Ontario, this support comes from many sources, including for example the Ontario Graduate Scholarships program from the provincial government; scholarships and research assistantships from the federal granting councils; teaching assistantships for undergraduate teaching that come from undergraduate operating funding; and tuition abatement and support for living costs that come from internal university funds and external donations.

The increasingly prevalent practice at Ontario universities and those elsewhere is to guarantee to every doctoral student – and at some universities, every research master's student – a funding package from a variety of sources equal to or greater than tuition plus \$1,000 per month, that is \$17,000-19,000 per year, for a period of four or, at some universities, five years.

Funding from each source will not necessarily increase at the projected rate of demand growth. For example, while increased undergraduate enrolment may well require additional teaching assistants, it is most unlikely that there will be twice as many such positions. A doubling of graduate enrolment in Ontario will require at the very least a doubling of the existing Ontario Graduate Scholarships and Ontario Graduate Scholarships in Science and Technology programs, while being sensitive to the implications of donor fatigue for the matching funding components of these programs. What is more, to ensure that Ontario universities indeed succeed in recruiting the best and most accomplished students, rather than become the second choice for the second best, additional graduate student support funds will be required to maintain competitiveness.

As in the case of capital requirements, careful work will be needed to ensure appropriate resourcing and co-ordination among these various funding sources, especially at the federal and provincial levels.

CONCLUSIONS AND RECOMMENDATIONS

The Task Force has concluded, as have several other studies and commentators, that the societal and economic growth, prosperity and competitiveness of Canada and Ontario will be dependent on the increasing supply of persons with advanced qualifications. Employer demand for holders of master's and doctoral degrees exceeds the Canadian supply of graduates with these degrees, and this demand is growing. And in response, the number of students available and wishing to meet that demand, by pursuing graduate education and earning those advanced qualifications, is also growing. The limitation on meeting the demand for graduates with advanced degrees and student demand for places in graduate schools to acquire those advanced degrees has been, and continues to be, the capacity of institutions to accommodate increased graduate enrolment.

In light of this the Task Force makes four recommendations.

RECOMMENDATION 1

The Task Force recommends that the Government of Ontario establish a 10-year goal of doubling the level of graduate enrolment in Ontario's universities.

RECOMMENDATION 2

The Task Force recommends that the Government of Ontario move immediately to full funding for graduate enrolments.

RECOMMENDATION 3

The Task Force recommends that the Working Group on University Capacity be tasked with developing a detailed plan for increasing graduate enrolment in the next five years, including the funding mechanism and the implications for graduate enrolments for institutions and disciplines.

RECOMMENDATION 4

The Task Force recommends that the Government of Ontario and the Government of Canada, with other provincial governments and university representatives as appropriate, develop a joint framework to support the increase in graduate enrolment to meet Ontario and national requirements.

ANNEX: THE COU GRADUATE EDUCATION PROJECTION MODEL

KEY ASSUMPTIONS

	ASSUMPTION	COMMENT
1	The demand for graduate places in Ontario universities is dominated by the demand by recent graduates of Ontario's undergraduate programs.	Approximately two-thirds of the current enrolment in graduate programs is composed of recent graduates from Ontario undergraduate programs.
2	The demand from the two other sources – Ontarians returning in mid-career and students from out of province – will increase in proportion to that of recent graduates from Ontario's undergraduate programs.	Both of these sources have reason to increase: the need for upgrading skills will encourage mid-career Ontarians to apply to graduate school and the need to attract excellent students from outside Ontario should increase the out-of-province numbers in line with Ontario students.
3	The projected intakes, enrolment and degrees resulting from the demand are based on Ontario universities maintaining the same entrance standards and having the resources that would enable them to increase supply to meet the demand.	Some assumption is needed to calculate intakes, enrolment and graduate degrees. This would seem to be the most neutral assumption.
4	The ratio of intakes to master's programs to the number of Ontario undergraduate degrees awarded in the previous academic year will increase at 0.7 percent per year to 2013.	After reviewing the trends in this ratio over the last 15 years, the Task Force provided this projection as its best guess. This corresponds to the best fit line of the last seven years of data.
5	The ratio of intakes to PhD programs to the number of Ontario undergraduate degrees awarded three academic years earlier will increase at 0.2 percent per year to 2013.	After reviewing the trends in this ratio over the last 15 years, the Task Force provided this projection as its best guess. This corresponds to the best fit line of the last six years of data.
6	The historical relationship of master's FTE enrolment being 0.95 times the sum of the intakes in the current and previous five years remains constant for the next decade.	The scale factor of 0.95 provides the best match of predicted to actual historical data over 15 years.
7	The historical relationship of PhD FTE enrolment being 0.95 times the sum of the intakes in the current and previous five years remains constant for the next decade.	The scale factor of 0.95 provides the best match of predicted to actual historical data over 15 years.
8	The historical relationship of master's degrees awarded in a particular year being 0.88 times the intake in the previous year remains constant for the next decade.	The relationship has been relatively constant over the last 15 years, and the Task Force found no evidence to suggest that it should substantially increase or decrease.
9	The historical relationship of PhD degrees awarded in a particular year being 0.72 times the average of intakes five, six and seven years previously remains constant for the next decade.	The relationship has been relatively constant over the last 15 years, and the Task Force found no evidence to suggest that it should substantially increase or decrease.

DATA AND PROJECTIONS

Academic Year	Undergraduate Intake	Undergraduate Degrees Granted	Ratio of Master's Intake to Undergraduate Degrees	Master's Intake	Master's FTE Enrolment	Ratio of Master's Degrees to Intake Previous Year	Master's Degrees Granted	Ratio of Doctoral Intake to Undergraduate Degrees Two Years Earlier	Doctoral Intake	Doctoral FTE Enrolment	Doctoral Graduation Rate	Doctoral Degrees Granted	Graduate FTE Enrolment
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1986-87		38,220	20.3%	7,767	14,176		6,242		1,756			986	22,215
1987-88		37,899	21.8%	8,345	14,498	80.7%	6,271		1,957			989	22,889
1988-89		37,873	22.1%	8,361	14,959	76.2%	6,363	5.6%	2,131			988	23,828
1989-90		38,347	22.1%	8,372	15,201	77.9%	6,514	5.8%	2,181			1,017	23,830
1990-91	56,072	39,739	21.5%	8,253	15,615	81.5%	6,822	5.3%	2,015			1,057	25,658
1991-92	57,340	41,398	22.7%	9,036	16,397	85.4%	7,051	5.6%	2,131	10,646		1,214	27,043
1992-93	55,258	43,888	21.5%	8,892	16,935	82.2%	7,432	5.4%	2,157	11,065	71.3%	1,252	27,999
1993-94	54,947	44,756	20.5%	9,003	17,032	90.4%	8,036	4.8%	1,987	11,216	67.1%	1,314	28,247
1994-95	55,145	47,009	19.1%	8,545	16,863	88.6%	7,979	4.5%	1,990	11,145	66.5%	1,418	28,008
1995-96	55,590	47,626	18.3%	8,602	16,815	92.7%	7,925	4.1%	1,856	11,033	68.3%	1,490	27,848
1996-97	55,891	47,966	17.7%	8,414	16,946	93.9%	8,074	3.4%	1,585	11,171	77.2%	1,555	28,117
1997-98	55,693	46,115	19.6%	9,400	17,377	91.5%	7,699	3.3%	1,569	10,864	73.0%	1,555	28,241
1998-99	56,920	46,331	21.6%	9,967	18,119	88.5%	8,316	3.8%	1,822	10,707	70.3%	1,517	28,827
1999-00	59,752	46,786	20.5%	9,515	18,367	83.8%	8,351	4.2%	1,944	10,900	70.4%	1,398	29,267
2000-01	60,061	46,620	22.0%	10,295	18,684	83.4%	7,934	4.7%	2,176	11,113	74.3%	1,478	29,797
2001-02	62,777	47,647	22.9%	10,658	20,317	87.9%	9,047	4.8%	2,249	11,149	78.3%	1,454	31,466
2002-03	72,208	50,018	23.5%	11,208	22,369	87.9%	9,366	5.0%	2,342	12,041	71.7%	1,136	34,410
2003-04	94,537	50,276	24.2%	12,096	22,102	87.9%	9,849	5.2%	2,426	12,458	71.7%	1,125	34,468
2004-05	76,442	52,550	24.8%	12,491	23,319	87.9%	10,630	5.4%	2,574	13,298	71.7%	1,306	36,402
2005-06	73,517	60,445	25.5%	13,403	24,559	87.9%	10,977	5.6%	2,801	14,129	71.7%	1,393	38,460
2006-07	75,624	79,136	26.2%	15,817	27,713	87.9%	11,779	5.8%	2,915	14,960	71.7%	1,560	42,319
2007-08	77,394	63,989	26.8%	21,231	35,136	87.9%	13,899	6.0%	3,151	16,273	71.7%	1,612	50,604
2008-09	80,329	61,540	27.5%	17,590	36,818	87.9%	18,657	6.2%	3,744	18,676	71.7%	1,678	53,624
2009-10	83,182	63,304	28.2%	17,324	33,113	87.9%	15,458	6.4%	5,059	20,213	71.7%	1,739	52,432
2010-11	85,801	64,786	28.8%	18,239	33,728	87.9%	15,224	6.6%	4,218	21,506	71.7%	1,845	54,616
2011-12	88,175	67,243	29.5%	19,095	35,408	87.9%	16,028	6.8%	4,178	22,921	71.7%	2,008	57,609
2012-13	90,548	69,631	30.1%	20,263	37,327	87.9%	16,780	7.0%	4,424	24,333	71.7%	2,089	60,969
2013-14	93,075	71,823	30.8%	21,443	39,555	87.9%	17,807	7.2%	4,656	25,485	71.7%	2,259	64,632

Notes

1. Degrees are assumed to be granted at the end of the academic year.
2. The estimates of master's and doctoral FTEs until 2002-03 are based on actual enrolment data using the method in the *Council of Financial Officers Compendium*, Table C-3, and from 2003-04 onward are based on projection data.
3. Estimates of undergraduate intake are derived from Ontario Universities' Application Centre data; the Ministry of Training, Colleges and Universities model; plus estimates of non-secondary and direct admissions. They include second-entry programs.

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